

使用L3out配置IP SLA功能以跟蹤靜態路由

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簡介

本檔案介紹如何在思科以應用程式為中心的基礎架構(ACI)中設定網際網路通訊協定服務層級協定 (IPSLA)，以追蹤從一個L3out得知的靜態路由，並僅當子網可從第一個L3out連線時，才向另一個L3out通告。

必要條件

需求

思科建議您瞭解以下主題：

- ACI軟體4.1版及更高版本
- L3out指向外部裝置或伺服器
- EX和 — FX機箱
- 跟蹤路由以使用網際網路控制訊息通訊協定(ICMP)和TCP探測 (在本範例中使用的是ICMP探測)

註：所有Cisco Nexus第二代交換機 (包括 — EX和 — FX機箱) 都支援ACI映像IP SLA。請閱讀[IP SLA的准則和限制](#)。

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- ACI版本5.2(2f)
- N9K-C93180YC-FX

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除 (預設) 的組態來啟動。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

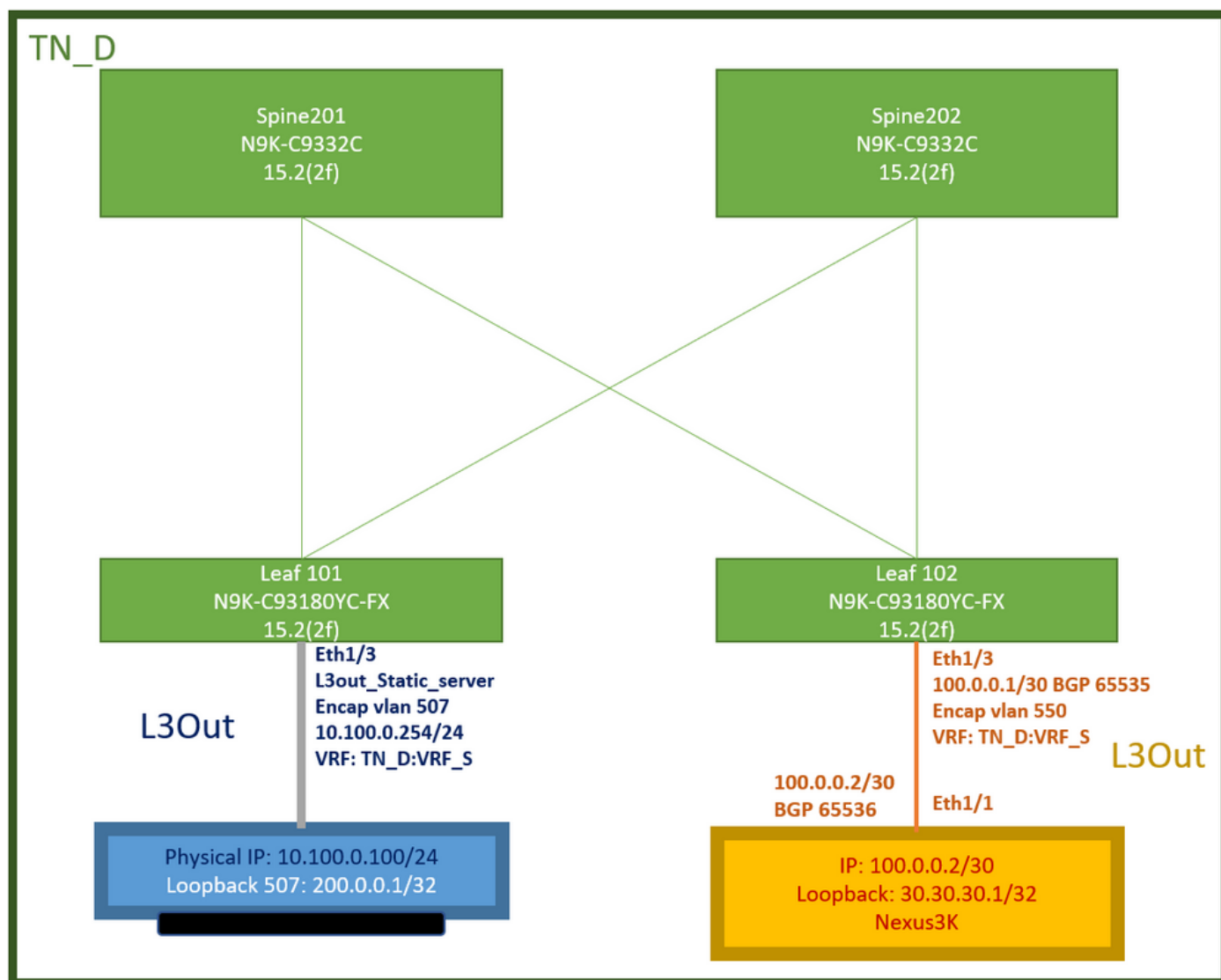
背景資訊

某些伺服器有多個介面（如環回），可通過伺服器的物理IP地址從ACI訪問。在這種情況下，您可能要求新增靜態路由並在外部進行通告，但前提是伺服器的物理IP可以訪問。因此，IP SLA跟蹤功能是不可避免的配置，只能通過針對這些伺服器的L3out配置來實現。目前，橋接域上的靜態路由不支持IP SLA跟蹤功能。在本文檔中，我們將查詢使用IP SLA的伺服器示例和傳輸路由配置。

設定

- 朝向伺服器和N3K裝置的L3out。
- 為伺服器的物理IP地址配置IP SLA跟蹤。
- 在L3out下配置到使用IP SLA跟蹤的伺服器的靜態路由，並從另一個L3out通告到N3K。

網路圖表



ACI實驗拓撲

組態

摘要步驟：

ACI交換矩陣策略：

- 建立合約(例如，一個允許使用所有流量的通用預設過濾器，但您可以使用在同一租戶本地建立的特定過濾器來允許特定流量。在這種情況下，請確保允許我們用於IP SLA跟蹤的協定)。
- 建立指向伺服器10.100.0.100/24的新L3out (ACI端SVI 550,IP地址為10.100.0.254)
- 建立IP SLA跟蹤策略 (IP SLA監控策略、跟蹤成員策略、跟蹤清單策略)
- 在L3out下向具有IP SLA跟蹤清單的伺服器新增靜態路由。
- 建立使用BGP(EBGP)ACI AS 65535和N3K AS 65536
- 從L3out向N3K匯出靜態路由。
- 驗證配置和可達性。

1. 建立合約 (例如，使用允許所有流量的通用預設過濾器，但是，您可以使用在同一租戶本地建立的特定過濾器來允許特定流量，但是在這種情況下，請確保允許使用我們用於IP SLA跟蹤的協定) 。



建立合約

2. 建立指向伺服器10.100.0.100/24的新L3out (ACI端SVI 550,IP地址為10.100.0.254) 。

L3 Outside - L3out_Static_server

Properties

Name: L3out_Static_server

Alias:

Description: optional

Annotations: Click to add a new annotation

Global Alias:

Provider Label:
enter names separated by comma

Consumer Label:

Target DSCP:

PIM:

PIMv6:

Route Control Enforcement: Import Export

VRF:

Resolved VRF: TN_D/VRF_S

L3 Domain:

Route Profile for Interleak:

Route Profile for Redistribution:

Enable BGP/EIGRP/OSPF: BGP OSPF EIGRP

Route Control for Dampening:

建立L3out

Logical Node Profile - L3out_Static_server_nodeProfile

Properties

Name: L3out_Static_server_nodeProfile

Description: optional

Alias:

Target DSCP:

Nodes:

Node ID	Router ID	Loopback Address
topology/pod-1/node-101	101.101.101.101	101.101.101.101

Create BGP Protocol Profile:

Create BFD Multihop Protocol Profile:

將節點連線到L3out

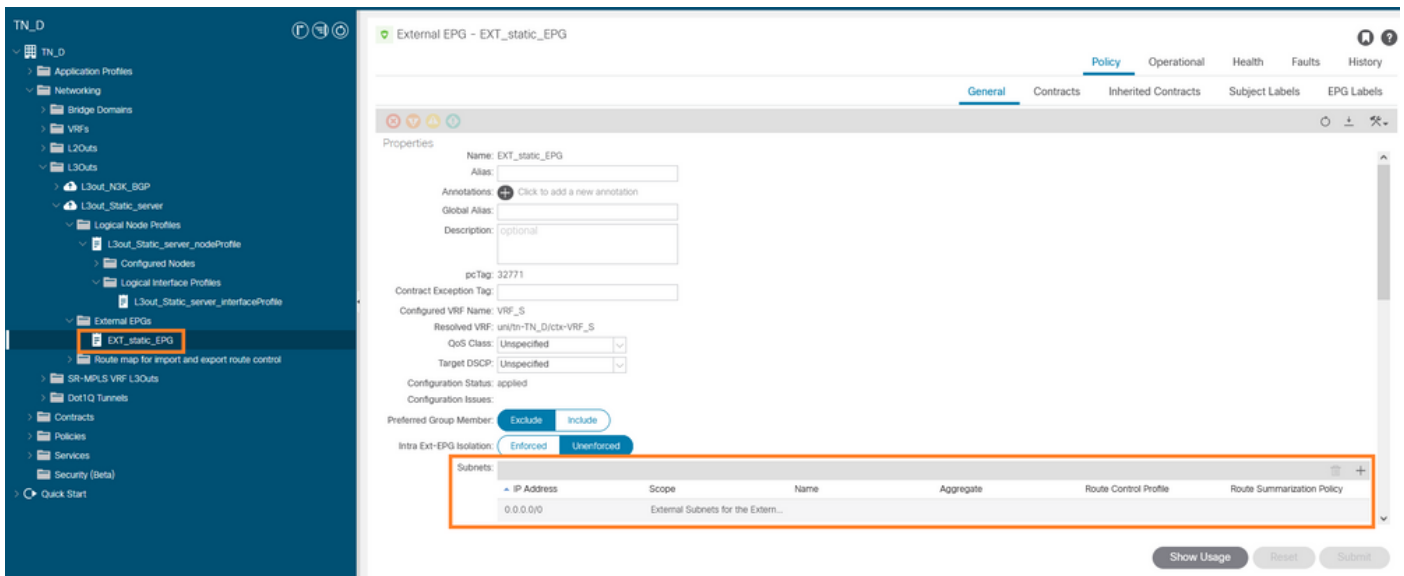
Logical Interface Profile - L3out_Static_server_interfaceProfile

Policy | Faults | History

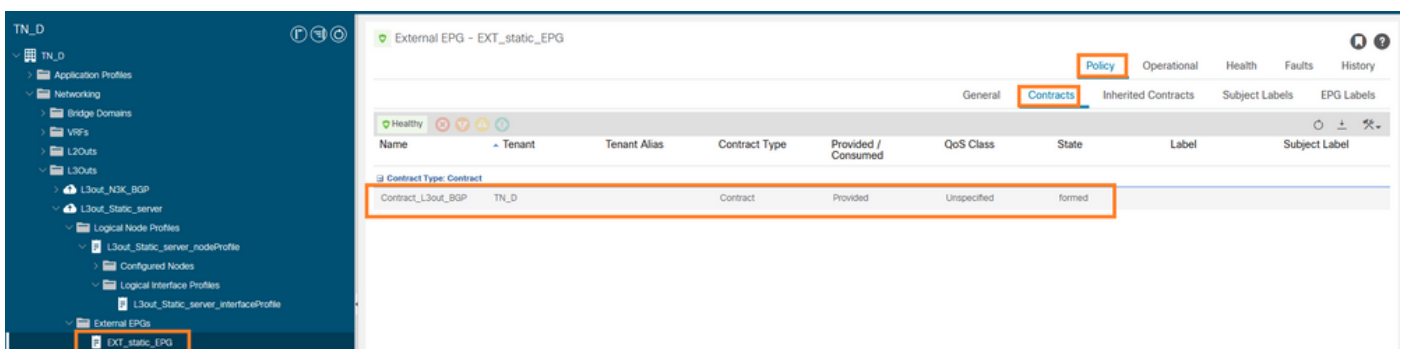
General | Routed Sub-Interfaces | Routed Interfaces | SVI | Floating SVI

Path	Side A IP	Side B IP	Secondary IP Address	IP Address	MAC Address	MTU (bytes)	Encap	Encap Scope
Pod-1/Node-101/eth1/2				10.100.0.254/24	00:22:BD:F8:19:FF	inherit	vlan-507	Local

將介面連線到L3out



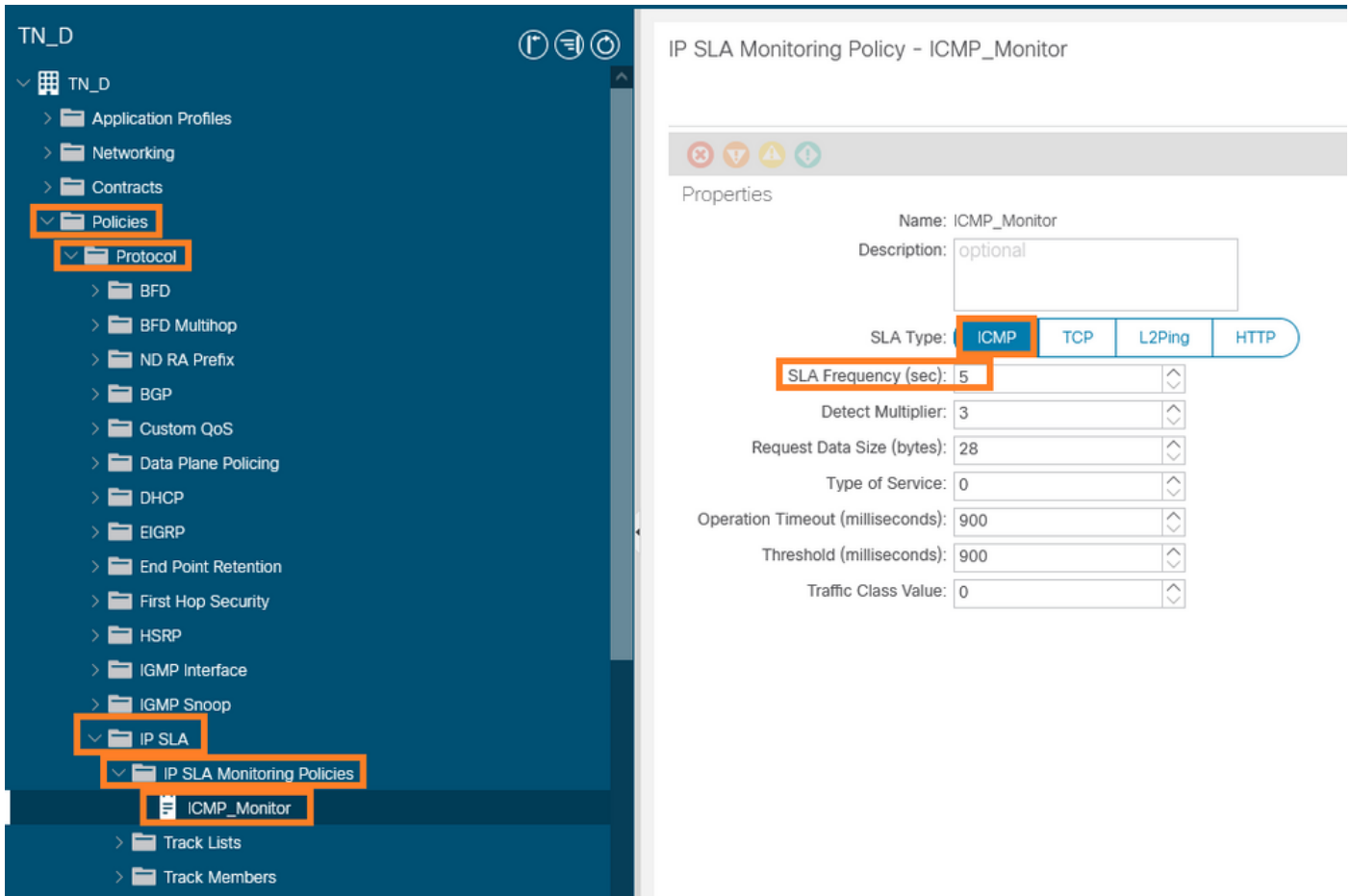
配置外部EPG



將合約附加到L3out

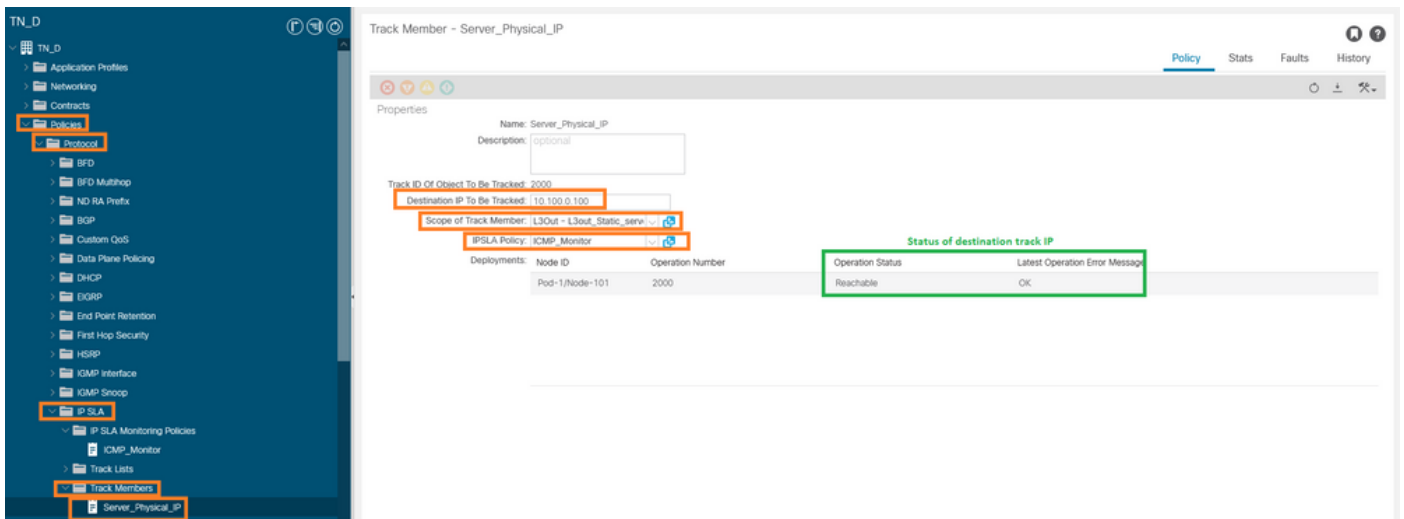
3. 建立IP SLA跟蹤策略 (IP SLA監視策略、跟蹤成員策略、跟蹤清單策略)。

IP SLA監控策略：



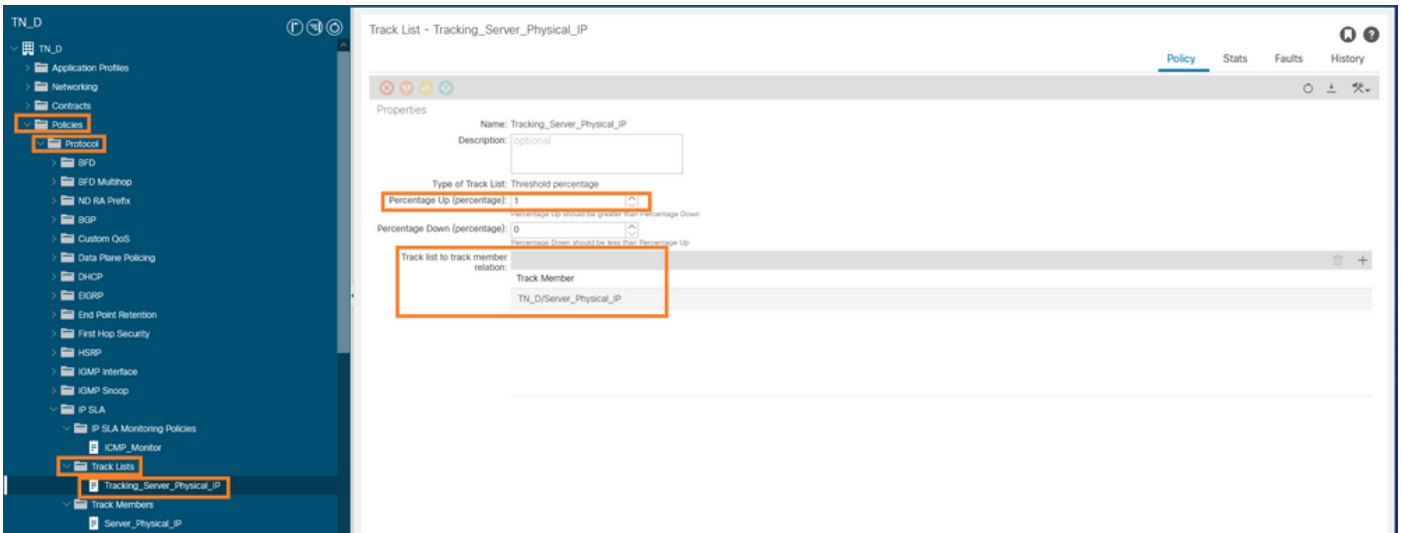
配置IP SLA監控策略

IP SLA跟蹤成員：



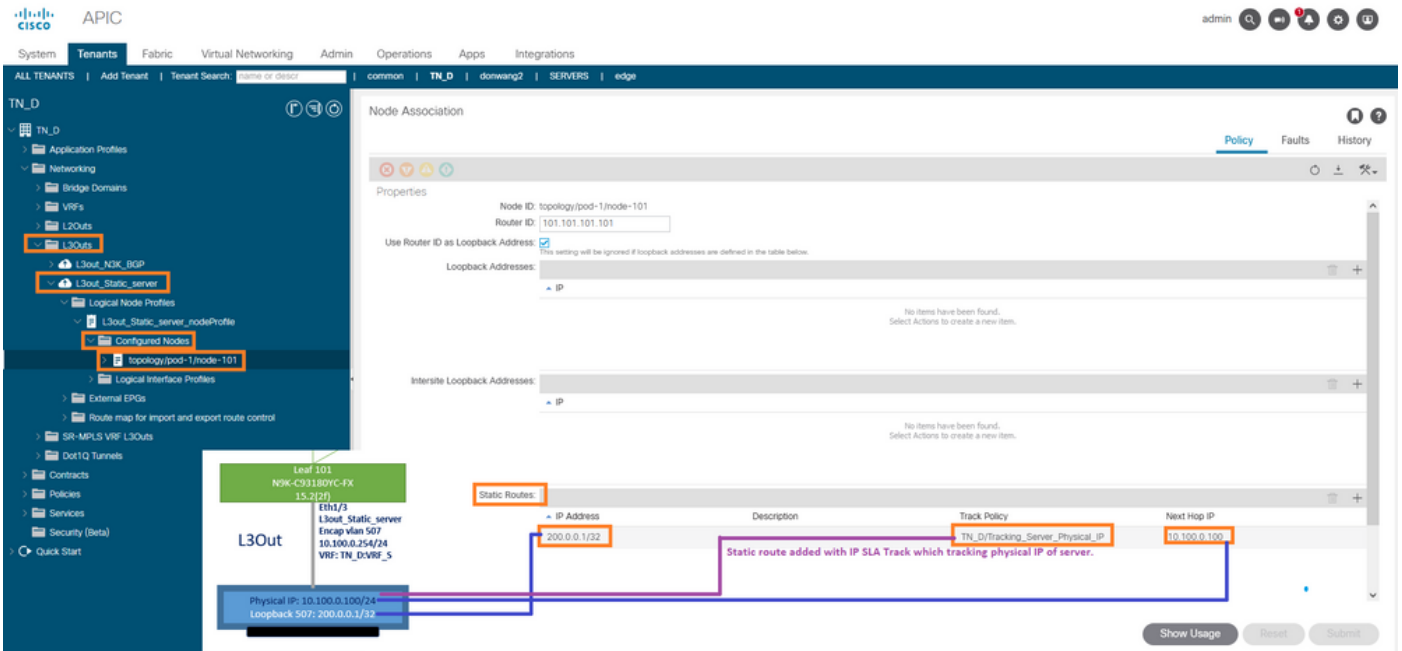
將IP新增到監控策略

跟蹤清單策略：



配置跟蹤清單

4. 使用新建立的IP SLA跟蹤清單策略在L3out下配置通往伺服器的靜態路由。



在L3out下配置靜態路由

5. 建立一個新的指向N3K裝置的L3out，該裝置使用邊界網關協定(BGP)。(EBGP)ACI AS 65535和N3K AS 65536。

Properties

Name: L3out_N3K_BGP

Alias:

Description: optional

Annotations: + Click to add a new annotation

Global Alias:

Provider Label:

Consumer Label:

Target DSCP: Unspecified

PIM:

PIMv6:

Route Control Enforcement: Import Export

VRF: VRF_S

Resolved VRF: TN_D/VRF_S

L3 Domain: TN_D L3Dom

Route Profile for Interleak:

Route Profile for Redistribution:

Enable BGP/EIGRP/OSPF: BGP OSPF EIGRP

Route Control for Dampening:

Address Family Type

設定BGP通訊協定

Logical Node Profile - L3out_BGP_nodeProfile

Properties

Name: L3out_BGP_nodeProfile

Description: optional

Alias:

Target DSCP: Unspecified

Nodes:

Node ID	Node ID	Loopback Address
Topology/Spw-1/node-102	102.102.102.102	102.102.102.102

BGP Peer Connectivity:

Peer IP Address	Peer Controls	Interface
100.0.0.2		Pod-1/Node-102/eth1/3

Create BGP Protocol Profile:

Create EFD Multihop Protocol Profile:

BGP對等設定檔

BGP Peer Connectivity Profile 100.0.0.2- Node-102/1/3

Properties

- Address: 100.0.0.2
- Description: optional
- BGP Controls:
 - Allow Self AS
 - AS override
 - Disable Peer AS Check
 - Next-hop Self
 - Send Community
 - Send Extended Community
 - Send Domain Path
- Password:
- Confirm Password:
- Allowed Self AS Count: 3
- Peer Controls:
 - Bidirectional Forwarding Detection
 - Disable Connected Check
- Address Type Controls:
 - AF Mcast
 - AF Ucast
- Routing Domain ID:
 - EBGP Multihop TTL: 3
- Weight for routes from this neighbor: 0
- Private AS Control:
 - Remove all private AS
 - Remove private AS
 - Replace private AS with local AS
- BGP Peer Prefix Policy: select a value
- Site of Origin:
- Remote Autonomous System Number: 65536
- Local-AS Number Config:
- Local-AS Number:
- Admin State: Enabled
- Route Control Profile:

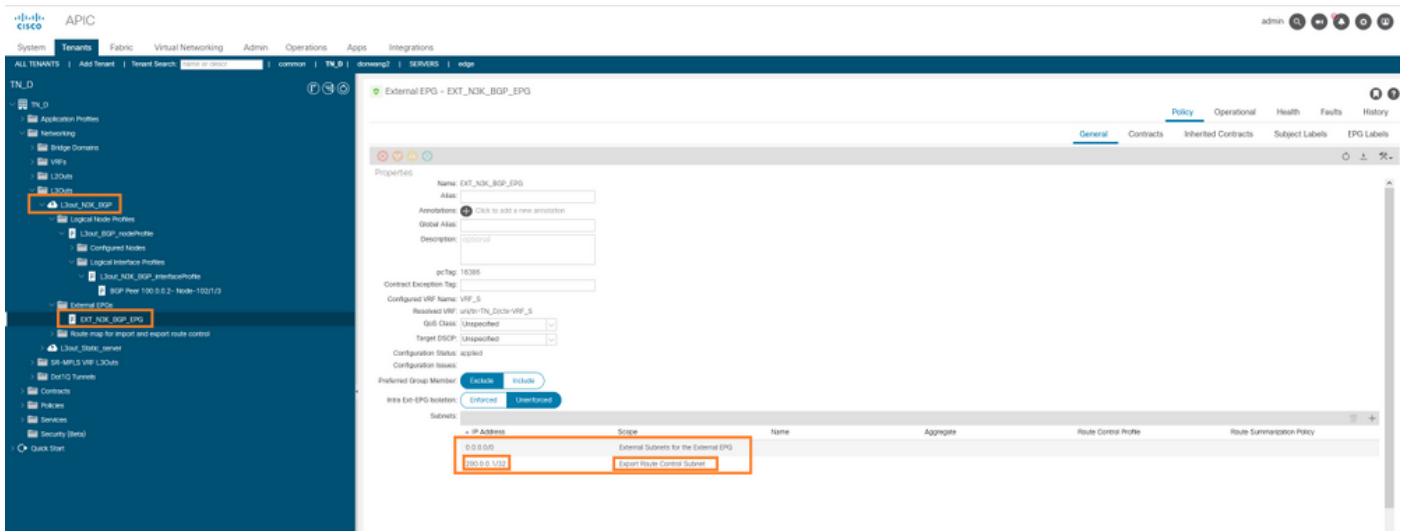
配置BGP對等策略

Logical Interface Profile - L3out_N3K_BGP_interfaceProfile

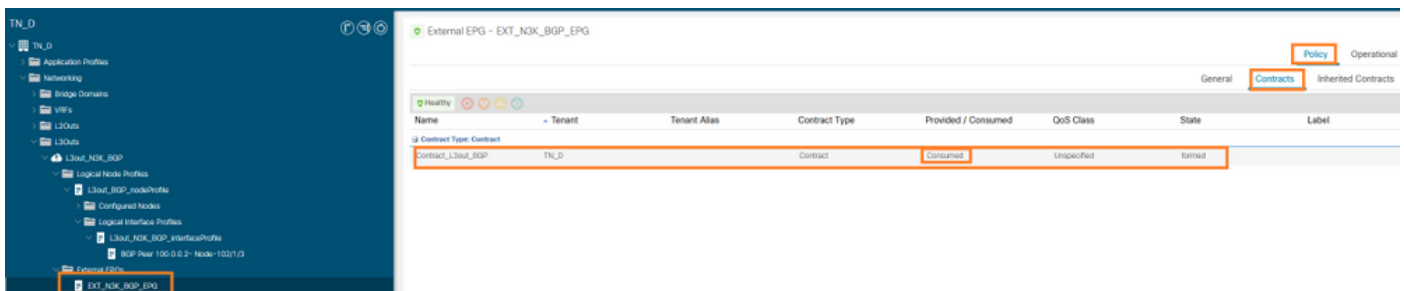
Policy

Path	Side A IP	Side B IP	Secondary IP Address	IP Address	MAC Address	MTU (bytes)	Encap	Encap Scope
Top-1/Node-102/1/3				100.0.0.100	00:22:80:F8:19:0F	inherit	vlan-500	Local

在L3out下配置邏輯介面配置檔案



外部EPG匯出傳輸中的子網L3out



將合約附加到外部EPG

6. 從L3out向N3K匯出靜態路由。

```

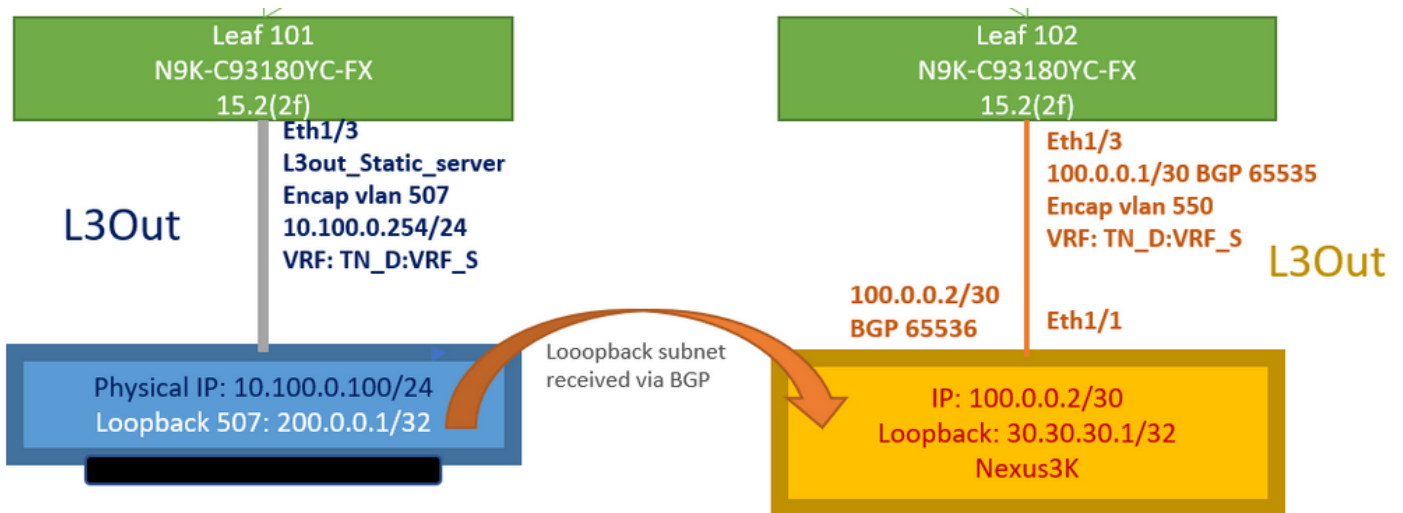
switchname N3K
feature bgp
feature interface-vlan
interface Vlan550
  no shutdown
  vrf member BGP_L3out
  ip address 100.0.0.2/30
interface loopback200
  vrf member BGP_L3out
  ip address 30.30.30.1/32
interface Ethernet1/1
  switchport mode trunk
router bgp 65536
  address-family ipv4 unicast
  neighbor 100.0.0.1
  vrf BGP_L3out
  router-id 3.3.3.3
  address-family ipv4 unicast
  network 30.30.30.1/32
  neighbor 100.0.0.1
  remote-as 65535
  update-source Vlan550
  address-family ipv4 unicast

```

驗證

使用本節內容，確認您的組態是否正常運作。

Nexus3K。



傳輸路由通告由拓撲說明

```
N3K# routing vrf BGP_L3out
```

```
N3K%BGP_L3out# show ip route IP Route Table for VRF "BGP_L3out" '*' denotes best ucast next-hop  
'**' denotes best mcast next-hop '[x/y]' denotes [preference/metric] '%' in via output denotes  
VRF 30.30.30.1/32, ubest/mbest: 2/0, attached *via 30.30.30.1, Lo200, [0/0], 02:35:27, local  
*via 30.30.30.1, Lo200, [0/0], 02:35:27, direct 100.0.0.0/30, ubest/mbest: 1/0, attached *via  
100.0.0.2, Vlan550, [0/0], 05:52:18, direct 100.0.0.2/32, ubest/mbest: 1/0, attached *via  
100.0.0.2, Vlan550, [0/0], 05:52:18, local 200.0.0.1/32, ubest/mbest: 1/0 *via 100.0.0.1,  
[20/0], 02:32:36, bgp-65536, external, tag 65535
```

源為N3K環回地址可訪問伺服器環回。

```
N3K
```

```
interface loopback200  
vrf member BGP_L3out  
ip address 30.30.30.1/32
```

```
N3K# ping 200.0.0.1 vrf BGP_L3out source 30.30.30.1
```

```
PING 200.0.0.1 (200.0.0.1): 56 data bytes  
64 bytes from 200.0.0.1: icmp_seq=0 ttl=252 time=0.94 ms  
64 bytes from 200.0.0.1: icmp_seq=1 ttl=252 time=0.729 ms  
64 bytes from 200.0.0.1: icmp_seq=2 ttl=252 time=0.658 ms  
64 bytes from 200.0.0.1: icmp_seq=3 ttl=252 time=0.706 ms  
64 bytes from 200.0.0.1: icmp_seq=4 ttl=252 time=0.655 ms  
--- 200.0.0.1 ping statistics ---  
5 packets transmitted, 5 packets received, 0.00% packet loss  
round-trip min/avg/max = 0.655/0.737/0.94 ms
```

ACI枝葉102路由表 (具有指向Nexus 3K的L3out) 。

```
Leaf102# show ip route vrf TN_D:VRF_S
```

```
IP Route Table for VRF "TN_D:VRF_S"  
'*' denotes best ucast next-hop  
'**' denotes best mcast next-hop  
'[x/y]' denotes [preference/metric]  
'%' in via output denotes VRF  
10.100.0.0/24, ubest/mbest: 1/0  
*via 10.0.96.64%overlay-1, [200/0], 02:56:36, bgp-65535, internal, tag 65535  
30.30.30.1/32, ubest/mbest: 1/0
```

<<address

of N3K.

```
*via 100.0.0.2%TN_D:VRF_S, [20/0], 02:44:34, bgp-65535, external, tag 65536
100.0.0.0/30, ubest/mbest: 1/0, attached, direct
  *via 100.0.0.1, vlan19, [0/0], 05:09:37, direct
100.0.0.1/32, ubest/mbest: 1/0, attached
  *via 100.0.0.1, vlan19, [0/0], 05:09:37, local, local
101.101.101.101/32, ubest/mbest: 1/0
  *via 10.0.96.64%overlay-1, [1/0], 02:56:36, bgp-65535, internal, tag 65535
102.102.102.102/32, ubest/mbest: 2/0, attached, direct
  *via 102.102.102.102, lo5, [0/0], 16:49:13, local, local
  *via 102.102.102.102, lo5, [0/0], 16:49:13, direct
200.0.0.1/32, ubest/mbest: 1/0
  *via 10.0.96.64%overlay-1, [1/0], 02:42:15, bgp-65535, internal, tag 65535
```

從CLI驗證枝葉101 IP SLA配置。

Leaf101# show ip sla configuration

```
IP SLAs Infrastructure Engine-III
Entry number: 2000
Owner: owner-icmp-echo-dme
Tag:
Operation timeout (milliseconds): 900
Type of operation to perform: icmp-echo
Target address/Source address: 10.100.0.100/0.0.0.0
Traffic-Class parameter: 0x0
Type Of Service parameter: 0x0
Request size (ARR data portion): 28
Verify data: No
Vrf Name: TN_D:VRF_S
Schedule:
  Operation frequency (seconds): 5 (not considered if randomly scheduled)
  Next Scheduled Start Time: Start Time already passed
  Group Scheduled : FALSE
  Randomly Scheduled : FALSE
  Life (seconds): Forever
  Entry Ageout (seconds): 3600
  Recurring (Starting Everyday): FALSE
  Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 900
Distribution Statistics:
  Number of statistic hours kept: 2
  Number of statistic distribution buckets kept: 1
  Statistic distribution interval (milliseconds): 20
History Statistics:
  Number of history Lives kept: 0
  Number of history Buckets kept: 15
  History Filter Type: None
```

Leaf101# show track brief

TrackId	Type	Instance	Parameter	State	Last Change
4	IP SLA	2000	reachability	up	2021-09-16T18:08:42.364+00:00
3	List	---	percentage	up	2021-09-16T18:08:42.365+00:00

Leaf101# show track

```
Track 1
  List Threshold percentage
  Threshold percentage is up
  6 changes, last change 2021-09-16T00:01:50.339+00:00
  Threshold percentage up 1% down 0%
  Tracked List Members:
    Object 2 (100)% up
  Attached to:
```

```
Route prefix 200.0.0.1/32
Track 2
  IP SLA 2000
  reachability is up
  6 changes, last change 2021-09-16T00:01:50.338+00:00
  Tracked by:
    Track List 1
```

使用託管對象查詢(Moquery)命令進行驗證：

```
apic1# moquery -c fvIPSLAMonitoringPol -f 'fv.IPSLAMonitoringPol.name=="ICMP_Monitor"'
Total Objects shown: 1
```

```
# fv.IPSLAMonitoringPol
name          : ICMP_Monitor
annotation    :
childAction   :
descr         :
dn            : uni/tn-TN_D/ipslaMonitoringPol-ICMP_Monitor
extMngdBy     :
httpMethod    : get
httpUri       : /
httpVersion   : HTTP10
ipv4Tos       : 0
ipv6TrfClass  : 0
lcOwn         : local
modTs         : 2021-09-15T21:18:48.195+00:00
monPolDn      : uni/tn-common/monepg-default
nameAlias     :
ownerKey      :
ownerTag      :
reqDataSize   : 28
rn            : ipslaMonitoringPol-ICMP_Monitor
slaDetectMultiplier : 3
slaFrequency  : 5
slaPort       : 0
slaType       : icmp
status        :
threshold     : 900
timeout       : 900
uid           : 15374
userdom       : :all:
```

```
apic1# moquery -c fvTrackMember -f 'fv.TrackMember.name=="Server_Physical_IP"'
Total Objects shown: 1
```

```
# fv.TrackMember
name          : Server_Physical_IP
annotation    :
childAction   :
descr         :
dn            : uni/tn-TN_D/trackmember-Server_Physical_IP
dstIpAddr     : 10.100.0.100
extMngdBy     :
id            : 2000
lcOwn         : local
modTs         : 2021-09-15T21:16:22.992+00:00
monPolDn      : uni/tn-common/monepg-default
nameAlias     :
ownerKey      :
ownerTag      :
```

```
rn          : trackmember-Server_Physical_IP
scopeDn     : uni/tn-TN_D/out-L3out_Static_server
status      :
uid         : 15374
userdom     : :all:
```

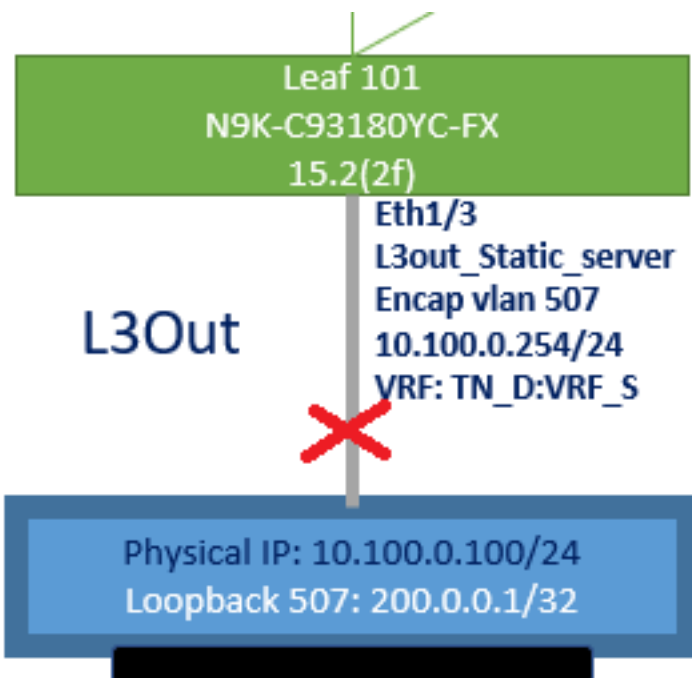
```
apic1# moquery -c fvTrackList -f 'fv.TrackList.name=="Tracking_Server_Physical_IP"'
Total Objects shown: 1
```

```
# fv.TrackList
name        : Tracking_Server_Physical_IP
annotation  :
childAction :
descr       :
dn          : uni/tn-TN_D/tracklist-Tracking_Server_Physical_IP
extMngdBy   :
lcOwn       : local
modTs       : 2021-09-15T07:41:15.958+00:00
monPolDn    : uni/tn-common/monepg-default
nameAlias   :
ownerKey    :
ownerTag    :
percentageDown : 0
percentageUp  : 1
rn          : tracklist-Tracking_Server_Physical_IP
status      :
type        : percentage
uid         : 15374
userdom     : :all:
weightDown  : 0
weightUp    : 1
```

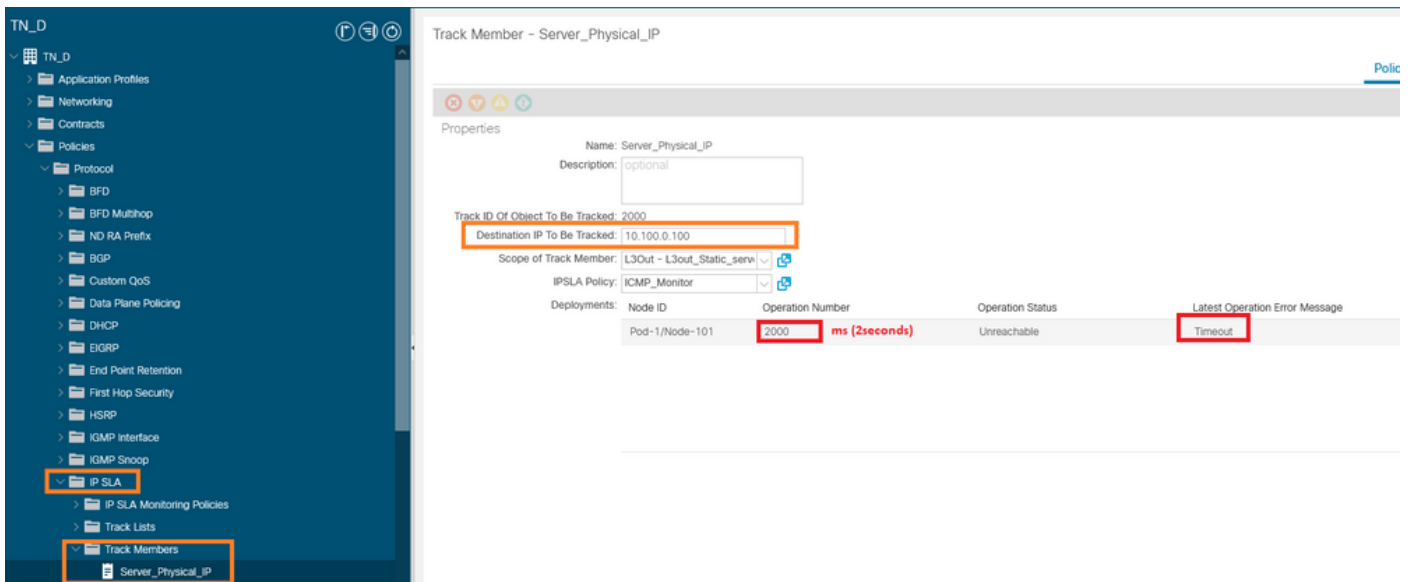
疑難排解

目前尚無適用於此組態的具體疑難排解資訊。

如果鏈路斷開或物理IP地址無法訪問，ACI IP SLA在配置的閾值達到之後顯示目標IP「timeout」。



L3out介面關閉



鏈路關閉後IP SLA監控鏈路狀態

枝葉101 CLI驗證 (您可以看到「上次操作返回代碼」超時)。

```
Leaf101# show ip sla statistics
```

```
IPSLAs Latest Operation Statistics
```

```
IPSLA operation id: 2000
```

```
Latest RTT: NoConnection/Busy/Timeout
```

```
Latest operation start time: 23:54:30 UTC Wed Sep 15 2021
```

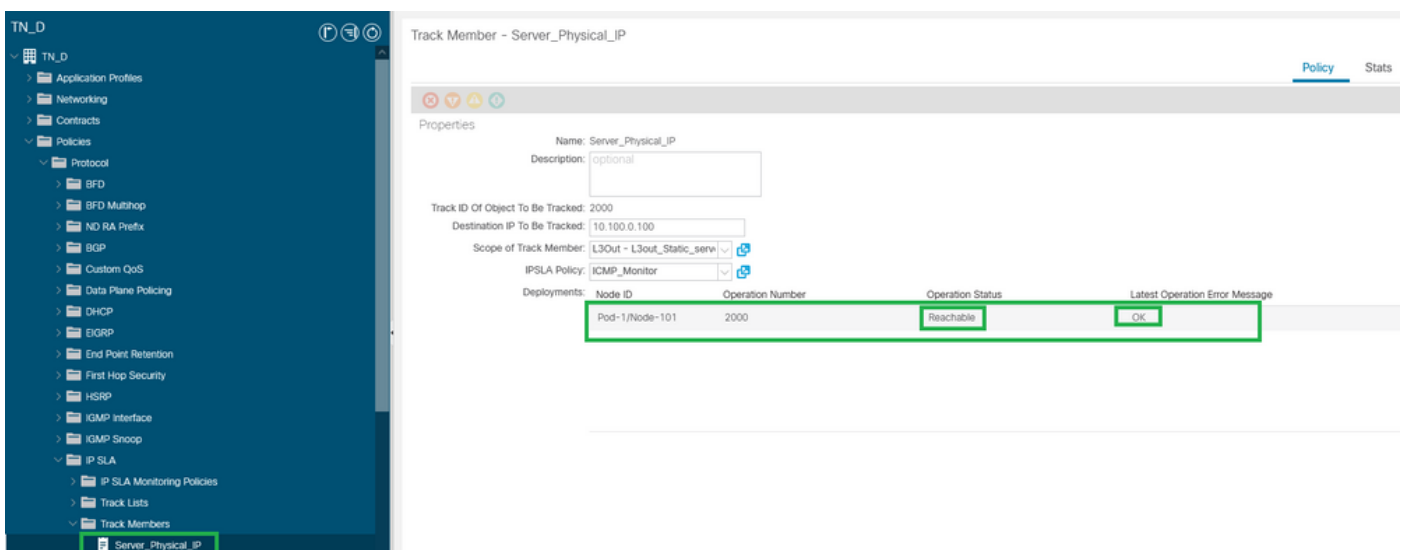
```
Latest operation return code: Timeout
```

```
Number of successes: 658
```

```
Number of failures: 61
```

```
Operation time to live: forever
```

只要伺服器可訪問，它就會顯示OK狀態。



鏈路啟動後的IP SLA監控狀態

```
Leaf101# show ip sla statistics
```

```
IPSLAs Latest Operation Statistics
```

```
IPSLA operation id: 2000
```

```
Latest RTT: 1 milliseconds
```

```
Latest operation start time: 00:03:15 UTC Thu Sep 16 2021
```

```
Latest operation return code: OK
```

Number of successes: 18

Number of failures: 86

Operation time to live: forever

相關資訊

- [思科APIC第3層網路配置指南5.2\(x\)版](#)
- [技術支援與文件 - Cisco Systems](#)